Cabot.

With the Compliments of the Author.

SURGICAL PAPERS.

BY A. T. CABOT, A.M., M.D.,
Surgeon to the Mass. General Hospital.

BOSTON:
DAVID CLAPP & SON.
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A CASE OF BRAIN CYST WITH JACKSONIAN EPILEPSY: OPERATION FOLLOWED BY RELIEF.[1]

THE following case is reported as a contribution to our knowledge of the pathology and operative treatment of epilepsy. The patient was an intelligent and good observer of his symptoms, thus making the clinical history reliable and full.

F. P. K., aged twenty-three, consulted me in the latter part of September, 1893, and entered the Massachusetts General Hospital for further observation and operation. He there had the advantage of careful consideration of his case by Dr. J. J. Putnam, to whom I am indebted for much assistance in my study of it. His history was as follows:

He had no tuberculous inheritance, but on his father's side there was some neurotic tendency. He had the usual diseases of childhood, having had measles the second time as late as 1891. He always lived in the country, and was a good scholar, leading his class at Exeter in 1889, and standing high in the Class of 1893 at Harvard. He never had a serious injury, but was struck on the top of the head twelve years before by a heavy stick which had been thrown up to knock down chestnuts. He was not stunned, but remembered that his head bled somewhat. He felt no after-effects of this blow.

In January, 1891, he first noticed an occasional feeling of numbness in the middle of the right thigh on the anterior surface. This was accompanied by a tickling sensation, and was so annoying that he would jump from his seat and slap and rub his thigh at the same time laughing in an excited manner; and this would be followed by a feeling of nervousness. These seizures appeared about once in three or four weeks.

[1] Read before the Boston Society for Medical Improvement, January 11, 1897.

In June, 1892, after a hard college year he went to Kansas, where the weather was hot and trying. He here had his attacks almost every day, and they soon began to be accompanied by contractions of the anterior muscles of the thigh and twitching in the abdominal region. His leg would become rigid, and would rotate back and forth involuntarily.

In August of that year he, for the first time, had a severe attack followed by general convulsions and loss of consciousness. This fit started as usual in the right thigh. After pinching and pounding the thigh, he ran a few steps to ward off the cramp, and fell to the ground on his right side. The right leg became rigid, while the foot was drawn sharply inwards (extreme talipes varus), and then the whole leg twitched convulsively. Then his head was drawn over sharply. In the last moment of consciousness he thought his neck and ankle would break, so strongly were they distorted. Consciousness was regained in twenty minutes. The attack was followed by vomiting. The next day he felt perfectly well. Soon after this he began to take bromide of potash, but in spite of this had occasional slight attacks.

On October 1st, after his return to college, he had another general convulsion. Through this winter he was able to keep on with his studies, but with occasional attacks, which were, for the most part, controlled by the inhalation of amyl nitrite. The attacks now began to be followed by a feeling of paralysis and numbness in the right leg.

In the middle of March the paresis following the attack affected not only the leg but the arm and face on the right side. He finished his college course, but he continued to have his attacks at intervals through the summer; and in the last one, in which he was prevented from having convulsions only by the prompt use of amyl nitrite, he had paresis of the leg, which came on slowly fifteen minutes after the attack, followed by a similar feeling in the face and then by a quick and complete loss of power in the arm. This condition lasted an hour or so. An hour and a half after the attack he had aphasia come on, lasting ten or fifteen minutes. His general health was good and his intelligence unimpaired.

We had here the history of a disturbance of nerve function beginning two years before, and at first affecting only the leg centre at the upper part of the fissure of Rolando. Gradually the irritation extended

down along the fissure of Rolando to the centres of the abdomen, shoulder, arm and face.

The degree of functional interference with these centres was also gradually increasing until he had a temporary paresis of the muscles following each attack. As the irritation began to reach the shoulder centre, it had attained a sufficient degree of intensity to affect the sensorium and led to a general convulsion.

It was evident that some change was taking place in the motor areas indicated by the above symptoms, but it was not clear what the exact nature of the change was likely to be.

We had to consider the possibility of tumor, including cysts, tubercle and gumma, and also of some degenerative change in some way connected with the old injury, either through the irritation caused by a depressed spicula of bone, by an adhesion of the membranes, or by some change originating in an injury to the brain substance itself.

The absence of the severe pain so characteristic of the invasion of brain tissue by a tumor, and the slow development of the symptoms, led us to regard gliomatous or sarcomatous tumor improbable. The history lent no support to the supposition that we had either a gumma or a tubercular tumor. On the other hand, the history of an injury to the head was so clear as to lead us to attach importance to it in seeking a cause for our symptoms.

The localization was so exact that no doubt was felt as to the wisdom of an exploratory operation; and it was decided that, in the event of finding no gross lesion sufficient to account for the symptoms, we should remove the thigh centre, as being the one in which the disturbance had first showed itself.

I had previously written to Mr. Horsley in regard to this patient, and followed the plan suggested by him, by dividing this operation into two stages.

On October 5th, the fissure of Rolando having been mapped out with a cyrtometer, an aperture was made in the skull, nearly square in shape, measuring two and a half inches in each diameter, over the part of the brain believed to be affected.

On October 10th the patient was again etherized, the flap turned back and the dura opened. The brain bulged considerably through the opening and did not pulsate with normal vigor. It was also noticed

that the cortical portion of the brain had a yellowish color towards the upper part of the opening. Some doubt was felt as to which of two parallel sulci were the fissure of Rolando. Dr. Putnam stimulated the brain with a feeble electrical current, but, even after the patient was allowed to come considerably out of his ether, failed to produce any response over the yellow portion where the disease was presumably located. Finally, applying the electrode towards the anterior part of the opening, considerably in front of the presumably affected area, a twitch of the arm and shoulder and then of the thigh followed the stimulation. Puncture was then made with a trocar through the yellow area and a spurt of brownish serum escaped. A small opening was made into a cyst cavity, with a smooth yellowish brown wall, about the size of a small pullet's egg, extending deeply into the brain towards the centre. No hardening or thickening anywhere could be detected in the walls of this cyst, and there were no papillomatous or other growths into it.

The size of the cyst made a removal of its whole wall a very formidable operation; and in the belief that it was probably a simple cyst, without malignant character, I decided to treat it by drainage in the hope of thus obliterating its cavity. Several large strands of loosely-woven silk were introduced as a drain, being brought out through an opening in the middle of the dural and skin flap.

The patient made a good recovery from this operation. The wick was removed on the third day, and he went home sixteen days later with everything solidly healed.

Until the middle of December (one month and a half) he had no epileptic symptoms. Then the aura was felt in the right thigh. From this time he had this sensation occasionally at varying intervals, sometimes as often as once a week and then again not oftener than once in three or four weeks. He continued to take bromide of potash at the rate of 40 to 60 grains a day.

Early in February (three months after recovery from the operation) he felt well enough to go West and begin work. In June he was working hard, and felt so well that he began to cut off the bromide; and when he got down to 35 grains a day, he began to have the aura more frequently. About the middle of the summer he began to notice that each time after the sensation of the aura he had a partial paralysis

of the right arm and leg, appearing twenty minutes to half an hour after the aura and lasting about an hour. He now also began to have severe headache about the old scar and frontal region, accompanying the attacks.

In October, having been a month without any epileptic feelings, he was promoted and had harder work. On November 4th, for the first time since September 9th, he had a recurrence of the aura, and between that time and the 15th he had six attacks. He now began to have twitching of the right arm, shoulder, neck and face, and he also experienced a constant numbness in the right hand, foot and leg. In one of the attacks of November the paralysis following the aura lasted from four to five hours. The latter part of November he began to have a very confused feeling about the face during the attacks, and could not move his eyes, they being held rigidly. He now had trouble in noticing persons and things on his right, and some loss of hearing in his right ear. His condition finally compelled him to give up work; and early in December, 1894, he came East and again consulted me.

It was evident from the nature of his symptoms and their gradual advance that he again had trouble in the old region, and it seemed probable that this was due to a refilling of the cyst.

He re-entered the hospital January 3, 1895. Examination at this time showed no change in the region of the scar. The pulsations of the brain were distinct. He was clumsy and sluggish in the movements of his right foot, but the grasp of his right hand was strong. His pupils were equal and reacted readily to light. The patellar reflexes were normal.

January 7, 1895. Operation under ether. The flap over the skull defect was reflected, and the dura mater was opened along the old incision. It was not adherent. As soon as the dural flap was lifted the brain began to bulge into the opening, and in a moment it gave way in the middle of a yellowish area which marked the site of the cyst. A spurt of thin, brown serum now burst through, the fluid being thrown out with some force. The outer wall of the cavity was freely cut away, and the cyst wall was seen to have the same character as at the last operation.

The size of the cavity seemed distinctly greater than at the previous operation. An attempt was made to separate and remove the cyst

wall, which was soft, yellowish, very friable, and about a line thick. In the parts about the opening this thin wall could be readily separated from the brain tissue beneath it; but after the sides of the cyst were reached deeper in the brain, this separation was harder to effect, both on account of the friability of the wall and because it was more adherent to the underlying brain. The attempt was, therefore, abandoned, and a large wick of gauze was introduced for drainage through a good-sized hole in the middle of the skin and dural flaps. This wick was introduced merely as a temporary measure until arrangements could be made for more efficient and long-continued drainage. To provide for this I had some glass tubes made of the shape of a shirt stud, the stem of which was as thick as a No. 20 French catheter and was perforated by an opening of sufficient size for good drainage. One of these, just long enough to reach through the skin and dura into the cyst cavity, was introduced on the third day, when the gauze wick was removed. The escape of fluid was much more free through this tube than it had been along the wick, and it continued to be quite abundant for ten days, after which it began to sensibly diminish, and the cavity as explored by the probe began to grow much smaller.

The patient had no sensation of aura after the operation, and was up on the seventeenth day. He went home on the twenty-sixth day; but the button was not removed until the forty-fourth day, at which time the cavity of the cyst being entirely obliterated, it was taken out and the opening quickly closed.

The subsequent history of the case is perhaps best given by the following abstract from a letter from Mr. K., in December, 1896.

About April 1, 1895, I was appointed to a position as inspector of an extension of the water works in Lincoln—a position which gave me employment for about two months in the open air, and involved no intellectual strain. In June of that year (1895) I was in excellent health, and had felt no suggestion of the old epileptic aura for about two months, and had taken no bromide or other sedative during that time. I then began to do a little studying preliminary to taking a course in physics at the Harvard Summer School. I almost immediately began to feel a slight return of my former sensations—a crawling numbness, if I may so express it, in my right shoulder and arm, and in the right side of my neck and face. The sensation was so very slight that at first I hoped I could finish the short course of study that I had undertaken in spite of it; but as the sensations rapidly became more frequent and more strongly marked, I concluded that I could not safely continue my work, and so gave it up after about three or four weeks.

Through the month of August I had absolute rest from mental work, and, as a result, enjoyed absolute immunity from these nervous sensations.

Meanwhile I had secured a position to teach school at Shrewsbury, Mass., and began my work there as principal of the high school, September 2d. For the first two or three weeks all went well, apparently, though the work was hard and the school a rather large one for one teacher. It soon began to tell on me, however, causing a return of the sensations of partial paralysis in my right shoulder, face and neck. With the exception of these sensations I felt very well indeed, and began taking bromide of potassium in the hope that I could keep up my school work till the end of the term at least, and not disappoint the committee. By the aid of the bromide I continued my work as principal for six weeks, and then resigned, as the sensations in the region of my right shoulder had become too decided to be longer disregarded. I returned to my home in Lincoln and worked about my brothers' greenhouses for a little over a month, stopped taking bromide at once, and after a week or two felt no further trouble in the region of my shoulder.

Late in November I took a position in an advertising agency in Boston as a solicitor, work which, though I detested it, kept me out of doors a good deal of the time and seemed to agree with my health very well, except that the continual walking apparently wore out my right foot, which ever since the last operation has not been normally sensitive. If I attempt to use that foot upon the pedal of a piano or upon the step of a carriage it is very liable to slip off, unless I watch it carefully, as I cannot tell by the feeling just where it is. In rising and moving away from a table, sometimes this foot catches against the leg of the table or chair ; I am aware that it touches something, but in what direction to move it in order to disengage it I am unable to determine until I look down and see on which side of the table leg my foot is.

Apparently the circulation is slower in this right foot than in the left, for it feels the cold in winter much more keenly than the left one does. As far as I can tell, the condition of this right foot is neither better nor worse than it was when I left the hospital nearly two years ago.

About February 1, 1896, I came to Albany to do some mathematical work, which consisted in the reading, criticism and preparation of manuscripts for a text-book in geometry. It required close application, but involved no responsibility or worry, and I was able to do it successfully, working about seven hours a day from Feb. 1st to the middle of June, and from the middle of August till the last of October. During this period I took no bromide, except a few doses when I was troubled with sleeplessness, and had only an occasional numbness, very slight, in my right arm, perhaps as often as twice a month. In general, since last February, I have enjoyed excellent health and have steadily gained in strengh and vigor.

On October 28th I was married. Since my marriage I have been occupying the position of examiner in the office of the regents of the University of the State of New York. This position requires me to do seven hours' mental work daily, but that does not appear to be too much for my strength, as I am feeling better now than at any time for more than four years.

I have quoted this letter at length in order to give a thorough idea of the condition following the operation, and to enable each reader to judge of the completeness of the cure. While we cannot be certain that future difficulty is not in store for him, it seems fair to accept this two years' immunity from anything approaching a really epileptic seizure as evidence that the cure has been more than temporary.

Cysts of the brain may be either traumatic, hydatid, or associated with the growth of a glioma. This was clearly not a hydatid cyst, as all of the characteristics of that form were wanting. Nothing suggesting the existence of a glioma could be made out in this case, and the duration of the symptoms made it improbable that a growth of that sort lay at the bottom of the pathological process. Unfortunately the bit of cyst wall removed was lost before reaching the pathologist, and was not examined. On the other hand, there was good reason to regard this cyst as of traumatic origin.

The fluid removed at the second operation was carefully examined, and found to consist of "mixed serum and blood." It was highly albuminous, contained much fibrin and was alkaline. The sediment consisted of normal and abnormal blood-corpuscles. Many of the latter had irregular and unusual forms, but their identity was established by their behavior with re-agents and staining fluids. There were also many small, white, mononuclear cells (lymphocytes).

This examination shows the fluid to be of the character that would be expected in a traumatic cyst, and confirms that diagnosis.

In cysts of this character a hemorrhage of greater or less extent usually acts as the starting point of the process, and the pressure of the fluid leads to the slow destruction and softening of the surrounding brain tissue, thus causing a gradual enlargement of the cyst cavity, which may go on for months or years.

It seems probable that the blow received on the head twelve years before may have caused the slight hemorrhage which served as a nucleus for this cyst to form upon. The slow growth of the cyst enabled the brain to adapt itself to the gradually increasing pressure until the motor centres were very considerably pressed upon by it. At the first operation, when their position was tested, they were found considerably anterior to the position where they might have been expected.

The gradual extension of the epileptic symptoms from the right thigh to the right side of the abdomen and finally to the arm and face would indicate that the original site of the cyst was probably near the motor centre for the thigh and gradually extended from there along the fissure of Rolando until it reached the centres for the abdomen, shoulder and face.

The proper surgical treatment of cysts of the brain is undoubtedly that advised by Mr. Victor Horsley in a personal letter to the writer, namely, to thoroughly excise the wall. This is especially true of cysts that have their origin in a gliomatous growth, and in such cases it offers the only hope of a lasting cure. It is almost impossible to determine in many cases whether any part of the cyst wall is gliomatous or not; and in this condition of uncertainty it is doubtless better to cut out the wall of all cysts when this is feasible.

It may sometimes happen that cysts will be encountered too large for such thorough removal of their walls, and in which the probability of a benignant character makes their treatment by drainage desirable. It is well, therefor, that we should learn what can be accomplished by this method.

The case I have reported is especially adapted to throw light upon this question from the fact that after ordinary drainage by wick, maintained for but a few days, had failed to cure it, a more efficient and persistent drainage was followed by apparent success. It would seem important to keep up the drainage until the absolute obliteration of the cavity is accomplished. This obliteration is brought about primarily, I think, by the expansion of the brain when the pressure upon it is relieved. It fills again with blood and tends to return to its normal position. Finally, the healing of the walls together is accomplished by the proliferation of the neuroglia and of the connective tissue about the blood-vessels.

The effort to bring about this kind of healing requires long aseptic drainage, and for this purpose the form of tube used in this case has some advantages. The wide, flat rim rests firmly on the skin and, having no projection, is not disturbed by slight movements of the dressing. Its length can be arranged to just enter the cavity and not to project unnecessarily into it. It can be made of glass or metal, so as to allow of thorough cleansing. The slightly projecting lip on the inner end serves to steady it in the cavity and to prevent its slipping out.

This patient remained well up to 1899 when he was last heard from.

A CASE OF BULLET-WOUND OF THE HEAD.

C. H., fifty-five years of age, entered the Massachusetts General Hospital on October 25, 1892. Twenty hours before entrance he had shot himself in the left side of the head with a revolver, the bullet, of 32-calibre, entering just above the left temporal bone. He was a Swede, and talked but little English, but would answer "Yes" or "No" to simple questions.

An examination showed the characteristic wound of entrance of a bullet of the described size. This opening was situated one and a half inches above a line drawn from the external orbital process to the junction of the helix of the ear to the scalp, and was nearly over the centre of this line, being slightly nearer to the ear than to the orbital process. His eyes were moderately contracted, but reacted equally to light. At the time of entrance his temperature was 101.4°; his pulse was 90, his respiration 36. He was seen soon after by Dr. J. J. Putnam, who made the following notes :

"The patient shows complete paralysis of the lower branches of the facial nerve, and difficulty in the movements of the tongue, also complete paralysis of the right hand and arm. Neither leg is wholly paralyzed, but both are equally weak. The knee-jerk is slight, but present at both sides. He is sensible to a prick everywhere. He seems to understand simple questions, and is apparently intelligent, but is evidently aphasic. His pulse is 84, respirations 27. He can swallow."

Dr. Putnam's opinion was that the lower Rolandic region, which lay close to the wound, was evidently seriously injured. How much further the damage extended could not be determined on account of the condition of general concussion. It was decided to operate with the object, primarily, of establishing drainage.

After thoroughly shaving and cleansing the head, the scalp was reflected and a trephine opening was made over the point of entrance of the bullet. A probe was then introduced through the opening in the dura mater, and, with the head turned on the side, was allowed to run by its own weight along the track of the ball. It slipped along

easily until it encountered the falx, where it stopped abruptly, but a little gentle manipulation carried it through the opening and it then ran, by its own weight, directly across to the skull on the other side. By taking a probe long enough to project considerably from the skull, while it lay in the bullet track, it was possible to sight pretty accurately the course of the ball. It was thus found that it had traversed the brain from side to side with an inclination backward; so that it must have struck the inside of the skull, on the other side, under the posterior part of the parietal eminence.

The probable point being determined by careful observation of the probe, a needle was thrust through the scalp, and, reflecting a flap, a trephine was put on; and when the button of the bone was removed, it was found that the probe from the other side touched the dura at the centre of the opening.

An incision was made in the dura, which had not been lacerated by the bullet. At once clots of blood and brain matter began to issue, and a probe, feeling about with great gentleness, demonstrated a cavity in the brain substance posterior to the opening. The finger was carefully introduced into this: the bullet was felt and, with a little difficulty, was seized and removed.

A drainage-tube was introduced into the cavity where the bullet had lain, and another small one was slipped just within the wound of entrance.

The patient gradually failed, and died twenty-four hours after the operation.

The interesting point in this case is that the method adopted succeeded in so accurately locating the point of the probe on the opposite side of the head. The probe was sighted while looking at the head first from the top and then from the side, and in each position a line was drawn passing around the head in the same plane with the probe and the eye. The point of intersection of these lines on the opposite side gave the position of the distal end of the probe. Fortunately, the bullet had not ricochéted after striking the inner surface of the skull, and was found close to the point of impact.

Patients often recover with an injury of the brain as extensive as seemed to exist in this case; and it would seem possible that had this patient come to operation earlier, the result might have been more favorable.

THE SURGICAL TREATMENT OF ANKYLOSIS OF THE TEMPORO-MAXILLARY ARTICULATION.

THE subject of ankylosis of the temporo-maxillary joint has received considerable attention from surgical writers, and many cases of operation for this condition have been reported. Like most procedures in surgery, these operations have a post-antiseptic history very different from that which they showed in pre-antiseptic days. Formerly, if the bone was divided and a false joint made, it was a not uncommon experience to have so considerable an inflammatory swelling and so much pain that the bones were fixed and held in apposition by the spasmodically contracted muscles, and when, finally, the parts were so far advanced towards healing as to permit of forcible motion being attempted, it was usually found that the ends of the bones were so fastened together that in spite of all endeavour the ankylosis returned and the case was no better than before. In attempting to obviate this difficulty extensive resections of the ascending ramus were undertaken in some cases, with the object of removing so much bone that the severed parts could not afterwards come together and unite. Of the operations devised upon this plan perhaps the most successful has been that of Esmarch, which consists in the removal of a wedge-shaped piece from the junction of the ramus and body of the maxilla through an incision just behind the angle of the jaw. In 1872, when surgery, stimulated by antiseptic teachings and results, was pushing forward along all lines, Bottini reported a case in which a good, permanent result was obtained by division of the neck of the jaw close to the articulation, and it was soon found that under aseptic conditions this method could be relied on to give a good false joint. Since that time, these two plans, with

occasional modifications by other operators,[1] have been rivals in the treatment of these deformities.

In considering these operations we must carefully distinguish between those cases in which the ankylosis is largely due to extensive cicatricial formations in the soft parts, as a result of noma, lupoid inflammation, or burn, and those in which there is a true bony ankylosis of the temporo-maxillary joint without involvement of the soft parts. When the jaws are bound by cicatricial contraction the section of the bone must be in front of the cicatrix, or at least must be so placed that the portion of the bone that is freed by the operation is no longer held by cicatricial bands. Necessarily, therefore, the division must usually be close to the body of the jaw, and for these cases Esmarch's operation is admirably adapted and obtains the best mechanical condition of the jaw possible under the circumstances. In the second class of cases, however, of true bony ankylosis it is plain that, other things being equal, the nearer the new joint is to the site of the old one the more nearly it conforms to the conditions on which the muscles were designed to act, and on which, *a priori*, they act best. In comparing, therefore, an operation which makes the section of the bone close to the old articulation with one which makes it at or near the angle of the jaw, we have to consider the former as the better operation, unless it has disadvantages either of danger, untrustworthiness, or unsightliness which more than counterbalance its mechanical advantages. My experience of the high section of the bone leads me to think it has none of these disadvantages, for in the seven cases in which I have operated in this way the mechanical result has been uniformly good, showing the trustworthiness of the procedure, and in none of them has the scar been unsightly. In all but one case it has been so slight as to readily escape observation at the end of a year. It is so placed that the hair

[1] Dr. J. E. Mears has reported an operation through the mouth in which he saws the ramus through on a level with the last molar tooth, and after separating the attachment of the temporal muscle he seizes the bone with lion forceps and forcibly twists it out. If it yields at the neck the condyle may be chiseled out or left. This method would not seem to be applicable for those cases in which both condyloid and coronoid processes are welded firmly to the bones of the skull, a condition not always discoverable before operation. The slight scar of the external operation makes it of less importance to attack the bone at a disadvantage within the mouth; and in the cases to which Dr. Mears's operation is applicable it removes more bone than is necessary, and has in that way a mechanical disadvantage. The results that Dr. Mears has figured are certainly very good.

can often be drawn forward over it and conceal it altogether. Paralysis of the orbicularis palpebraru mmuscle was troublesome in two of the early cases, but finally disappeared. By keeping the incision close up to the zygoma this can be avoided.

I have met with no especial element of danger in these operations except that which is common to any operation upon an ankylosed jaw —namely, the danger of asphyxia under anæsthesia. In one case the breathing was stopped by the falling of the tongue into the throat, and a quick tracheotomy was performed. Recognizing this danger, I have always had the tracheotomy instruments laid out during these operations, and this was the only case in which I had to use them. It is true that a case is reported in which the carotid artery was wounded, but this would have been avoided had the section of the bone been carried out inside of the periosteum in the manner I shall presently describe. My operation has been in the main after the manner of Bottini. It has been as follows. In the first place, to discover on which side the ankylosis exists is not always easy. Cases have been reported in which the sound side was operated on by mistake. To determine this point the history should be investigated, and often it will be found that the original osteo-periostitis which led to the ankylosis was distinctly limited to one articulation. The history is, however, often doubtful on this point, and a decision must be reached by an examination of the jaw itself. If the fingers are pressed in on the teeth upon each side, and at the same time the patient makes vigorous attempts at mastication, a springing of the bone on the free side will be noticed, in quite distinct contrast to the fixity on the ankylosed side. Furthermore, as there is usually a loss of cartilage and even of bone in the process which destroys the joint, the jaw naturally falls over to that side, and this lateral displacement may be readily made out by noting the relation of the middle lines of the two jaws as shown by the incisor teeth or otherwise. After a study of these several points a mistake must be exceedingly rare. In my first two cases I made the incision vertically over the neck of the jaw, but later I adopted Bottini's incision along the lower edge of the zygoma, with a vertical cut added if more room was needed. The vertical incision should not extend far down in front of the ear lest the facial nerve suffer injury, but it may run up over the zygoma. The incision is carried at once down to the bone, which is

cleared by a periosteum elevator. The division is then made with a chisel, which cuts out a wedge across the whole width of the bone which represents the neck of the jaw, even when this is a mass involving both the condyloid and coronoid processes. With care this division can be kept within the limits of the periosteum, and all danger of injury of the carotid artery is thereby avoided. To ensure safety a curved retractor may be carried under the posterior edge of the bone during the use of the chisel, thus wholly obviating any danger of injury to the vessels lying there. In none of my cases has the internal maxillary artery even been injured. When the bone is completely divided the final separation may be accomplished by pushing a wedge-shaped screw gag into the cleft in the bone and so forcing it apart. The ends of the bone are then readily rounded off with rongeur forceps. The hemorrhage is trifling and the wound may be tightly closed. A cork should be kept between the teeth on the injured side for the first week or fortnight while the healing is going on, but may be taken out as often as is desired for passive motion after the first three or four days. The following is a brief summary of the seven cases on which I have operated.

Case 1.—A girl, aged thirteen years, suffered from ankylosis of the left temporo-maxillary joint for ten years, the result of scarlet fever. She was operated upon in August, 1887, the neck of the condyle being chiseled through just below the point where it became welded into the temporal bone. This was done through a vertical incision about one inch in length. Slight loss of power over the eyelid supervened, but this disappeared after a few months. The patient was seen on Jan. 19th, 1895, eight years after the operation. At that time the scar of the incision was barely visible. She noticed that to tightly close the left eye required more effort than in the case of the other, but the ordinary movements of the eyelid were perfect. The left side of the jaw was somewhat undeveloped as compared with the other. The mouth opened three-fourths of an inch, and there had been no change in this since just after the operation. Lateral motion was considerable, one-quarter of an inch or more, and the grinding power was good.

Case 2.—The patient, a girl aged seventeen years, had ankylosis of the left temporo-maxillary articulation of thirteen years' standing, which followed mastoid disease caused by scarlet fever. She was

operated on in July, 1888. The operation was begun with a vertical incision, but as it was found that the coronoid process was also involved in the mass of bone welding the maxilla to the temporal bone a cross incision was made along the lower edge of the zygoma. This patient was examined on Jan. 9th, 1895, eight years after the operation. The scar of the operation was not very noticeable, and she said that its appearance had caused her no annoyance. When her mouth was widely open the gums were $\frac{7}{8}$ in. apart, and with her plates of teeth in place she could open her mouth half an inch. The mastication was vigorous, and she had capital grinding power. The eyelid had good motion.

Case 3.—A woman, thirty years of age, fell when three years old, striking her chin, and this was soon followed by ankylosis of the left temporo-maxillary joint. Forcible attempts to separate the jaw with wedges accomplished a bending of the body of the lower jaw, so that while the molars and even the gums in the back part of the mouth were in close apposition the incisors were about one-half a centimeter apart. An operation was performed in April, 1889, in the manner followed in Case 2, and here, too, the welding of the jaws to the temporal bone was by a thick irregular mass of bone. Some temporary paralysis of the eyelid followed the operation. This patient was seen on Jan. 14th, 1895. The motions of the jaw were well preserved and the grinding power was excellent. When the mouth was open the aperture between the teeth measured between three-quarters of an inch and an inch. The scar of the operation was practically invisible, it being difficult to determine, except by close inspection, which was the side of the operation. While the motions of the eyelid were perfectly preserved there was a perceptible difference between the action of that side of the face and the other. This was mainly noticed when laughing, and consisted in an excessive action of the muscles around the eye on the affected side rather than in any lack of power in them. This was so slight as not to be annoying.

Case 4.—A woman, aged thirty-two years, received a blow upon the jaw when six years of age. This was soon followed by ankylosis of the right side of the jaw. An operation was performed on Dec. 13th, 1889. The incision was made just beneath, and parallel to, the zygoma and was crossed by a short vertical incision through the skin alone. The

condyloid and coronoid processes were both welded to the skull by an irregular mass of bone. This was chiseled through. She left the hospital well on the thirteenth day after the operation. The patient was seen in Dec., 1894. At that time the scar of the operation was barely visible. The motions of the jaw were good. The mouth opened a little over an inch and there was good grinding power with lateral motion of a quarter of an inch. The motions of the eyelid were perfect.

Case 5.—A woman, aged twenty-six years, suffered from ankylosis of the tempero-maxillary joint, which had followed a blow on the chin in infancy. An operation was performed on July 15, 1890. The first incision was beneath and parallel to the zygoma, with a short cross incision through the skin. In the midst of the operation the patient became asphyxiated owing to the dropping of the tongue back into the throat. An immediate tracheotomy was performed and the chiseling of the jaw was then finished. The wound suppurated, owing, no doubt, to some contamination of it after the tracheotomy. Still, the recovery was not seriously interfered with and the patient left the hospital twenty-three days after the operation. This patient was seen on Jan. 7th, 1895, four and a half years after the operation, when the possible separation between the incisors was an inch. Lateral motion was one-quarter of an inch. The grinding motion was good, but the grinding was interfered with by the irregular arrangement of the molar teeth, which did not properly correspond in the two jaws. The scar was slightly depressed, but not unsightly. Movements of the eyelid were not in any way interfered with.

Case 6.—A boy, aged eight years, had scarlet fever when six years old. Otitis followed, and rapidly progressing ankylosis of the jaw occurred. When seen the jaw was fixed by bony ankylosis, with the teeth immovably in apposition. He was operated upon Jan. 15th, 1890. A short incision was required as the condyloid process alone was fixed to the temporal bone, and the section and removal of the neck of the jaw was easily performed. The wound healed by first intention, and he left the hospital in nine days. He was seen two years later with perfect control of all the motions of a mouth which opened as widely as in any boy of his age. He had perfect grinding power.

Case 7.—A woman, thirty-seven years of age, when she was aged seven years received a blow on the right cheek, followed by much pain

about the ear, with gradual closure of the jaws, so that at sixteen years of age they were tightly approximated and fixed. Forcible efforts with wedges accomplished a sufficient separation to allow of the food being pushed between them. She was operated upon on July 19th, 1891. The incision was made parallel to, and close under, the zygoma. As in all but two of my seven cases, the upper end of the ramus was welded to the skull by a large irregular mass of bone which was chiseled through. The recovery from operation was uneventful. This patient was seen on Jan. 8th, 1895. She had had all the lower teeth but one molar drawn, and had not yet had a plate made. There was a distinct downward bend in the body of the lower jaw as a result of the long-continued wedging which had preceded the operation. As a consequence of this, the anterior gums did not closely approach the upper teeth, being held apart by the last remaining lower molar. The jaws could be separated an inch, and there was fairly good grinding motion, as appreciated by the rubbing to and fro of the solitary lower molar against the upper range of teeth. The scar was not conspicuous and the motions of the eyelid were good, though she said that when she was tired or nervous she was somewhat troubled by twitching of that eye.

The first two of these cases were published in Transactions of the American Surgical Association (vol. vii.), the others have never been reported. The restoration of motion in all of these cases was thoroughly satisfactory, and has been maintained now for a sufficient number of years in each case to warrant the belief that it is permanent. It is particularly worthy of note that the grinding power was recovered in every case. In Cases 1 and 6 the division was through the neck of the condyle, so that all of the masticatory muscles retained their proper relations, except the external pterygoid, which was separated from its attachment. In the other cases the coronoid process was involved in the ankylosis, so that in them the attachment of the temporal muscle was also lost. The masseter and internal pterygoid muscles were in no way interfered with, and gave ample support and power to that side of the jaw.

A review of the literature of the subject has yielded reports of sixty-two operations upon cases of bony ankylosis of the temporo-maxillary articulation, and the five hitherto unreported cases of the writer bring

this number up to sixty-seven. Of these, forty-seven were done by Bottini's method and twenty were done by other methods involving a section of the jaw through the ramus at some point nearer the angle. These figures would seem to show a preponderance of surgical opinion in favor of the operation close to the zygoma. A careful comparison of the functional results by the various operations is impossible on account of the incompleteness of many of the reports in this regard. As far as could be judged, however, the method of Bottini furnished better power of motion than any of the operations near the angle. This search into the experience of others has thus confirmed the opinion which the writer formed from the study of the mechanical principles involved and of the final permanent results in his own cases, and has led him to consider the operation devised by Bottini to be the best one known, up to the present time, for the relief of this most distressing deformity.

The following references to the literature of the subject, which are all that a rather thorough search has yielded, may be of service to future investigators.

Bibliography.

Diefenbach: Operative Chir., 1845. Koenigsdoerfer: Inaugural Dissertation, 1855. Esmarch: Beiträge zur Chirurgie, 1860, Band ii. Weber: Pitha und Billroth, 1868, Band iii. Bottini: Communication to the Medical Academy of Turin, 1872. König: Deutsche Zeitschrift für Chirurgie, Band x., 1878. F. Bruncke: Inaugural Dissertation, Göttingen, 1878. Ranke: Archiv für Klinische Chirurgie, Band xxxii., Heft 3; collects nine cases—namely, Bottini, König (2), Schulten, Ranke (2), Hagedorn, von Langenbeck, Mears and Kuhlen-Kampf. Kuhlen-Kampf: Centralblatt für Chirurgie, 1885, No. ii. Schulten: Nord. Med. Ark., Stockholm, ix., 13. Gerster: Medical News (Philadelphia), vol. xlix., 1886, p. 581. Lange: New York Medical Journal, vol. xlv., 1886, p. 640; also Medical News (Philadelphia), vol. xl.x., 1886, p. 581. Pugh: Liverpool Medico-Chirurgical Journal, 1887, vol. vii. Mears: Transactions of the American Surgical Association, vol. i., 1883, also Transactions of the College of Physicians, Philadelphia, 1887. Page: Brit. Med. Jour., vol. ii., 1887, p. 1277. Kuster: Langenbeck's Archiv, 1888, xxxvii. Cabot: Transactions of the American Surgical Association, vol. vii., 1889. Penrose: Philadelphia Medical News, 1890, vol. lviii., p. 596. Sola Huerta: Rev. Med. Farm. de Aragon, Zaragoza, 1890, vi., 82. Chabry: Annales de la Policlinic de Paris, 1890-1891. Allingham: Brit. Med. Jour., vol. i., 1891, p. 129. Russo Travali: Silicia Med. Torino-Palermo, 1891, iii., pp. 156–158. Hoffa: Centralblatt für Chirurgie, 1891, No. 32. Jenadi: Centralblatt für Chirurgie, 1891, No. 21. Hedrich: Gazette Médicale de Strasburg, 1891, i., p. 49. Greig: The Lancet, Dec. 19th, 1891, p. 1383. Busardi: Boll. d. Clin., Milano, 1891, viii., 357; and Lo Sperimentale, Firenze, 1891, lxvii., 32. Pousson: Rev. Med. Farm. de Aragon, 1890, vi., 82. Rechnitz: Beiträge zur Casuistik der Kieferklemmer (Würzburg), Berlin, 1891.

W. Knight: Dental Register, Cincinnati, 1892, xlvi., 170–178. Caponi: Thèse, Lyon, 1892. Borella: Gaz. Med. Comb., Milano, 1892, li., 51. Kummer: Bulletins et Mémoires de la Société de Chirurgie de Paris, 1892, xviii., 295. Rosving: Biblioth. f, Læger, Kjöbenhavn, 1892, 7 R., iii., 171–204. Gardner: Australasian Medical Journal, Melbourne, 1893, New Series, vol. xv., 54. Von Bergmann: Archiv für Klinische Chirurgie, Berlin, Band xlx., 664. McCosh: Annals of Surgery (Philadelphia), 1893, vol. xviii., p. 39. Poulton: Australian Medical Gazette, 1893, vol. xii., 220. Pilcher: Brooklyn Medical Journal, 1893, vol. vii., 763. Demons: Mémoires et Bulletins de la Société de Médicine et Chirurgie de Bordeaux, 1893–1894, p. 253, and 1894, p. 18. Sarycheff: Medic. Oboz., Moscow, 1894, xii., 52. Saritsher: Medic. Oboz., Moscow, 1894, xii., 527–531. Swain: The Lancet, July 28th, 1894, p. 187; collects twenty cases by the following operators—Jones, Davy, Heath, Page, Barker, Mason, Spanton, and Swain.

OBSERVATIONS ON MALIGNANT ADENOMA OF THE RECTUM.[1]

In malignant disease of the rectum the rational time for operation has usually passed when the surgeon first sees the case. The early stages of cancer of the rectum are painless, and the slight irritation felt at first is commonly disregarded. During the time thus lost the lymphatics become infected and any radical cure is thereafter hopeless.

Since Kraske's paper in 1885 the operative technique has been so improved that the removal of a growth in the lower bowel is not extremely difficult or dangerous. The ready access to the parts afforded by the posterior incision, with the removal or displacement of the lower part of the sacrum, enables us to make our dissection intelligently under the guidance of the eye and to readily control hemorrhage.

The upper part of the rectum is so movable that it can be drawn down for a considerable distance, and the peritoneum has no terrors for us when any opening made into it is in sight and can be closed by sutures. The exactitude with which operations of this region can be carried out, greatly increases the chance of the radical cure of malignant growth there: but, in order that this cure may be accomplished, it is important to recognize these growths early.

Most carcinomata of the rectum, except the epitheliomata of the margin of the anus, have a distinctly glandular character and are to be classed as adeno-carcinoma (Orth. Ziegler).

The exact relation between the true adenoma in which the epithelium remains limited by the basement membrane (tunica propria) and the adeno-carcinoma, in which the epithelium has broken through that membrane and invaded the tissues outside of it, has never been clearly shown.

[1] Read before the Boston Society for Medical Improvement, March 8, 1898.

We have no facts upon which we can positively base the opinion that these tumors start as true adenomota and later take on the carcinomatous character.

The observation that tumors are sometimes removed which, for the most part, have the histological character of an adenoma, but in which some small area shows a cancerous change, does, however, lend considerable support to the above opinion. It is also to be noticed that the true adenomata which are occasionally found in the rectum are, as a rule, small tumors, while the larger growths of this nature almost always have distinct cancerous characteristics.

In the cancerous degeneration of papillomata of the skin we have an opportunity to study a change closely analogous to that which we have such good reason to believe occurs in these concealed growths of the rectum. At least we may feel that our best working hypothesis is that a certain number of these adeno-carcinomata have a stage during which they are benign tumors; and even in some of those which quickly show a carcinomatous character there is probably an appreciable time after the epithelial growth breaks through the tunica propria before the lymphatic channels convey the infective cells to any considerable distance from the mother growth.

What now are the physical characteristics by which we may recognize these growths in their early, comparatively innocent stages?

They may start either as pedunculated or flat sessile tumors. The pedunculated forms are readily recognized by the examining finger. They are to be distinguished from the fibrous polyps so common in the rectum first by their situation. The little fibrous polyps are usually found just inside the anus, while these adenomatous polyps have their seat higher up in the rectum. The adenomata, too, as a rule, have a rougher surface than the fibrous tumors. When they have attained a little size, they have the feeling and the form which leads them to be characterized as cauliflower growths.

The sessile forms of adenoma start as little, slightly raised growths on the rectal wall, and presently, as they get larger, develop a slightly nodulated character. They cause so little trouble that the chance of discovering one in its very earliest stage is small. Their usual seat is in the upper part of the rectum, and they often escape the examining finger unless great care is exercised.

The first symptoms by which these adenomatous tumors make their presence known are hemorrhage and a sense of irritation in the rectum. Hemorrhage is sometimes noticed a considerable time before any other symptom appears. In a recent case in which a fully developed cancer of the whole tract of the rectum existed, the first hemorrhage had been noticed five years before the patient came under my observation, and persisted in a moderate amount for three years before medical advice was sought. The doctor who then saw the patient discovered a tumor high up at the top of the rectum which he could barely reach with his finger. At the time that I saw the patient, two years later, the whole rectum was involved in a hard, nodular, infiltrating mass. This gives some idea of the comparatively slow development of these growths.

The hemorrhages are usually ascribed by the patient to piles; and the attending physician is, not infrequently, too ready to accept this diagnosis without sufficient investigation. If the stools are carefully examined at the time when the hemorrhage first makes itself noticeable, it will often be found that they contain mucus streaked with blood, a condition which should always lead to a strong suspicion of a growth such as we are considering, rather than an ordinary hemorrhoidal condition.

The following cases illustrate rather well the clinical history of these patients and also the method of operation about which I especially wish to speak:

Case I. E. H. H., forty-six years of age, was first seen at the Massachusetts General Hospital on March 9, 1896. A year previous to this time she had had quite a decided discharge of blood from the rectum. Previous to that she had, for a considerable time, moderate hemorrhages which she thought were due to piles. She had also, on one or two occasions, passed little, soft spongy masses, one of which was examined and called a polyp. The only sensations that had called her attention to the rectum was a dragging pain, and once an attack of rectal tenesmus.

Examination at the time I saw her showed a little growth with rough surface like a raspberry, situated in the upper part of the rectum and only reached with difficulty by the examining finger. On March 18, 1896, she was etherized and under the relaxation of

anesthesia the growth could be reached and hooked down with the forefinger to an easily accessible portion of the rectum. An incision was made over the left side of the sacrum. The posterior edge of the sacrum was removed, and an opening made through the posterior rectal wall. Through this opening the little tumor, as large as an English walnut, was pulled out. It was attached to the anterior wall of the rectum, and a portion of that wall was pulled through the posterior opening with it. The attachment was by a rather broad pedicle, but the growth did not seem to penetrate into the mucous membrane about. The pedicle and neighboring portion of the rectal wall was cut out, the wall of the rectum being closed with cat-gut stitches as it was cut. The closure in this way was very satisfactory, so much so, that after the removal of the growth, the posterior opening in the rectum was closely stitched up. The patient made a good recovery.

Examination of the growth showed it to be an adenoma; and Dr. W. F. Whitney, the pathologist who examined it, thought that the epithelium had not broken through the tunica propria, consequently that the tumor had not yet taken on a malignant character.

Case II. I. W. J., a rather delicate man of fifty-nine, was seen by me on February 21, 1897, in consultation with Dr. J. Q. A. McCollester of Waltham.

The patient had always been subject to dyspepsia. Two years before this time Mr. J. began to be especially troubled with indigestion, and at about the same time he also began to notice the presence of mucus and occasionally of blood in his stools.

These conditions had continued up to the time I saw him, with a gradual increase in the amount of mucus and blood, which, however, had never been excessive. The only pain or discomfort that he had suffered was that associated with indigestion and the consequent flatus.

A digital examination revealed a nodular growth high up in the rectum, which did not encircle the bowel but projected from the anterior wall. It seemed about as large as a good-sized prune, but its upper edge could not be reached. It seemed freely movable and was not painful nor did it bleed after the examination.

The diagnosis of adeno-carcinoma was made and its removal advised. Mr. J. was put to bed with a carefully regulated diet; and on March 2, 1897, the operation was done as follows:

With the patient lying on his right side, well over towards his face, an incision was made along the left border of the sacrum down to a point just below the tip of the coccyx. The coccyx and the left part of the sacrum, as high as the third foramen, was cut away with bone forceps. An opening was now made in the posterior wall of the rectum as high up as possible. With considerable traction the growth could be drawn down into the opening, but it could not be brought outside. The rectal wall was a good deal puckered where it gathered itself, as it were, into the base of the tumor.

An attempt was made to cut, bit by bit, through the attachments of the growth, stitching the rectal wall together as we went. This effort had to be abandoned, however, owing to the inaccessibility of the parts. The growth was then cut away with a margin of healthy rectal wall around it. As the tumor was situated on the wall of the rectum covered by peritoneum, we now had an opening into the peritoneal cavity, and, owing to the fact that a considerable portion of the rectal wall had been gathered into the growth, this opening was a large one. Again an effort was made to close this, but it was presently found that an accurate closure was impossible.

The next question was how to prevent the fecal contents of the bowel from escaping into the peritoneal cavity. Fortunately, our preliminary cleansing of the bowel had been very efficient, and up to this time we had not been incommoded by any escape of its contents.

I now took a deep stitch through the rectal wall, just above the opening left by the removal of the growth, and drew it forcibly down to the lower edge of the posterior opening in the bowel and attached it to the skin. In this way the opening in the anterior wall of the bowel was drawn down below the posterior opening so that the feces could escape posteriorly without reaching the opening into the peritoneal cavity. For further security this opening into the peritoneal cavity was snugly packed with iodoform gauze so as to protect it from any leakage of feces in that direction. This packing had the further advantage of checking all oozing from the wounded rectal wall. This arrangement worked as we intended to our complete satisfaction. The bowels moved freely without contamination of our peritoneal wound. At the end of three days the stitch holding the anterior rectal wall was cut, allowing it to spring up and resume its normal position.

The next day, believing the peritoneal cavity to be safely walled off, we began gradually to remove the gauze. This packing was wholly out in three or four days. The cavity left by its removal was of considerable size; but it was readily accessible, and was freely irrigated at each dressing. It gradually closed down until at the end of about fifty days it had entirely closed and only a slight pucker in the anterior rectal wall marked where it had been.

During this time Mr. J's health and strength had improved, so that he was in decidedly better condition than before the operation.

Finally, on May 8, 1897, the posterior opening in the rectum was refreshed and closed by buried catgut stitches, the skin being brought over it with silkworm-gut stitches. Healing was by first intention.

Since this time Mr. J. has remained well, having in the autumn of 1897 resumed an active business life. He was examined in February, 1898, by Dr. E. H. Stevens, of Cambridge, who found the rectal wall smooth without any sign of recurrence of the growth. At this time Mr. J. weighed more than he had ever done in his life.

Both of these cases show the slow rate of development of these tumors, and even in Case II, in which the tumor had a distinctly cancerous character, the growth was clearly circumscribed and had acquired no adhesions to parts about. Whether through the lymphatic system any extension of the disease to distant parts had occurred, it is still too early to say. The manner of removal by a posterior incision in the rectum high above the sphincter was eminently satisfactory in both cases. The closure of the rectal wall by sutures as the growth is cut away (Case II) is the method of choice, and for small and early growths would usually be feasible. In larger growths, especially when seated at a rather distant portion of the rectum, the difficulty of closing the opening must be great, as the stretched rectal wall springs back as it is cut, and the opening being irregular its accurate closure is made impossible. Under these circumstances the plan adopted in my case may be found useful.

Another method of treating such a wound would be to reach it from above by a median abdominal incision, and to close it by sutures from the peritoneal side. This procedure was considered in the case reported, but the fear of infection in going directly from a rectal to an abdominal wound led to the adoption of the method used.

Besides the two cases above reported, the writer has had a number of cases of cancer of the rectum in which the Kraske incision has been used for the removal of the growth, from five to seven inches of the bowel having been removed on several occasions. In all of these cases an artificial anus has been established in the upper angle of the wound. The peritoneum has been opened in several of these operations but has been easily closed by stitches and has given no further trouble.

Some of these patients have been quite comfortable for a considerable time afterwards, while in others the newly-formed orifice has been sensitive and has occasioned more or less distress. All that were afterward heard from suffered recurrence of the disease;[1] but this is not strange, as in all of them the growth was far advanced when it came under observation. In all of them the immediate recovery from the operation was satisfactory.

In none of my cases have I carried out the plan of making an inguinal colotomy in preparation for an operation upon a rectal cancer, but I recognize the value of this diversion of the bowel contents when an extensive resection of the rectum is to be attempted, especially when it is desired to preserve the sphincter and to make an end-to-end suture after the removal of the growth. I have, on one occasion, resected a portion of the sigmoid flexure for cancer in a patient upon whom I had done a previous colotomy. The artificial opening above certainly relieved our stitches of all strain during the healing process and removed that source of danger and anxiety.

Since this paper was read the writer has had two cases of rectal polyp (adeno-carcinoma), in which the operation was carried out through a Kraske opening, with incision of the posterior rectal wall. The growth in each case grew from the anterior rectal wall, being in one instance as large as a small fist; in the other case, about the size of half a hen's egg. It was attached over that portion of the rectum which is covered by the peritoneum. In each case, before cutting off the growth, the rectal wall behind the growth and wide of it was sewed through and through with a cobbler's stitch, which entirely con-

[1] Since this was written a patient on whom a resection of about seven inches of the rectum was done fifteen months ago has reported and been examined. There is, as yet, no sign of recurrence.

trolled the hemorrhage and at the same time held the rectal wound closely approximated with the peritoneal surfaces in apposition. Both the patients were old and anæmic men, but did extremely well after the operation and had no trouble from peritoneal inflammation.

THREE CASES OF COMPOUND FRACTURE OF THE PATELLA, IN WHICH THE BONES WERE WIRED WITH GOOD RESULTS.

These cases are reported as a contribution to the statistics of this operation.

It is the writer's feeling that in simple fractures of the patella the added risks of an opening into the joint are so great that the best treatment is by apparatus, with bandaging so applied as to bring the fragments as close together as possible. In such cases an operation may be required after the leg has recovered if the fragments are so far apart that the limb is practically useless. Ordinarily, however, the ligamentous union gives a strong and useful leg even when the fragments are separated by a considerable interval.

In compound fractures of the patella where we already have an opening into the joint the question is quite a different one, and the operation of wiring seems to be demanded in every case; for not only is the chance of a useful joint increased by wiring the bone, but we have also the opportunity of clearing the joint of blood and fragments of bone, and with dependent drainage provided for, the chance of a healing by first intention without suppuration is greatly increased.

In all of the cases reported silver wire was used, and this wire was cut off short and buried by being pressed down firmly against the surface of the bone. In none of the cases did the wire give any trouble.

Case I. John B., a large, vigorous man of twenty-nine, entered the Massachusetts General Hospital, July 15, 1887, with a compound comminuted fracture of the right patella.

Under ether, the opening was enlarged by a transverse incision over the joint. The middle portion of the bone was shattered into small pieces which lay about loose in the joint, and were thoroughly removed.

The fragments remaining attached to the quadriceps tendon and the ligamentum patellæ were evened off with a saw, so that smooth surfaces could be approximated, and then attached to each other by two wires.

Dependent drainage was provided by tubes low down on the sides of the joint, and the leg was placed on a posterior wire splint.

Healing took place by first intention, and he left the hospital on September 13th, with a stiff bandage on the leg.

In November he was going about with no bandage and with good motion in the knee, and in December his knee was so well and strong that he could go upstairs two steps at a time. In the latter part of December he made a misstep coming down stairs, and refractured the patella, the separation occurring, as nearly as could be made out, along the line of union of the old fracture.

He re-entered the hospital on December 26th, in Dr. Porter's service, and the case was treated as a simple fracture by apparatus.

He left the hospital on January 28th, with a stiff bandage. When this was taken off two months later, the patella was found firmly united by what appeared to be bony union. One of the wires could be felt, but had caused no trouble, and the vertical diameter of the patella was one-half an inch greater than on the well side.

The leg gradually became strong, and the motion in the joint was restored until in May, 1891, the patient could bend the knee considerably past a right angle, and ordinary walking was not interfered with. The patella was perfectly movable.

Case II. J. B., a heavy man of fifty-one, fell from a roof on October 22, 1888, sustaining a simple comminuted fracture of the left patella, while in the right leg he suffered a compound comminuted fracture of the patella, and a compound fracture of the thigh about four inches above the knee-joint.

The opening into the right knee-joint was enlarged by a transverse incision.

The bone was so thoroughly comminuted that after the loose pieces had been removed, there were left two small fragments attached above to the quadriceps tendon, and one still smaller wedge-shaped piece on the ligament below.

A wire was passed from side to side through the two fragments

above, and the lower fragments being too small to give holding-ground, the wire was passed through the ligament just below it.

When this wire was tightened, it drew the little wedge of bone below up between the two upper fragments and held it firmly.

Dependent drainage was provided by tubes on the sides of the joint and the leg was treated on a posterior wire splint as in the former case, with the addition of extension to the thigh by a modified Buck's apparatus.

The wounds in the leg healed by first intention, in spite of the fact that a severe facial erysipelas developed about a fortnight after the injury.

At the end of two months the patella was firmly united, and the knee had a good degree of mobility. Unfortunately, the thigh did not unite, and in consequence of this fact the whole leg was encased in plaster.

In the summer of 1890, hearing that this patient's leg was useless on account of the ununited fracture of the thigh, I sent for him, and he re-entered the hospital. Under ether I cut down upon the ends of the bone, and dovetailed them so that they fitted together and were held in position by the tension of the muscles.

This operation was followed tardily by union of the femur, but the long confinement of the leg in apparatus and stiff bandages had led to a stiff knee.

Now on May 5, 1891, the right patella which was wired is fixed to the front of the femur. There is very slight motion between the femur and tibia.

On the left leg the patella is so closely united that no interval can be felt between the fragments, and there would seem to be bony union were it not that by grasping the upper and lower portions of the bone firmly a little lateral motion can be detected. This knee has good motion and is strong.

The good motion that was found in the right knee at the end of two months when the patella was firmly united, shows beyond a doubt that this knee would have been at least as good as the other if passive motion could have been begun at that time.

Unfortunately, the long subsequent confinement of the leg (two years) finally caused a fixation of the patella, and stiffness of the joint.

Case III. James M., a strong man of twenty-seven, entered the Massachusetts General Hospital August 3, 1890. He had just fallen from a freight car, striking the ground upon his knees, and had sustained a compound comminuted fracture of the left patella.

He was at once etherized. The opening over the patella was enlarged by a long incision transverse to the joint. The blood and loose fragments were removed from the joint, and there then remained one large fragment attached to the quadriceps above, and two small fragments attached to the ligamentum patellæ below. Two wires were introduced, each of them attached one of the lower fragments to the large upper fragment. Drainage-tubes were introduced low down on the sides of the joint, and the wound was stitched together. Recovery was uninterrupted. The stitches were all taken out on the eighth day, and the wound was perfectly healed by first intention.

At the end of three weeks the patient left the hospital on crutches, with the left leg encased in plaster. This plaster bandage was removed about two months later, at which time the bone was found to be firmly united, and the patient was allowed to begin passive motions for the restoration of the functions of the joint.

May 6, 1891, the following condition existed. The wired patella seemed to be firmly united by bony union, and equalled the patella on the well knee in size. It was freely movable. The leg was strong, and the knee would bend almost to a right angle. Steady improvement was still going on in the usefulness of the joint.

In all of these cases the result as far as apposition of the fragments and restoration of the bone was concerned, was better than can ordinarily be obtained in simple fractures of the patella which are treated without operation. As far as can be judged at this time the fragments have united in all three of these cases by bony union, and what is more, the patella which has resulted in each case is three or four times as large as the fragments of which it was composed. In each instance the middle part of the patella was broken into a number of loose fragments that had to be removed from the joint cavity, leaving comparatively small fragments to be attached together, yet the patella in each case has been restored to its full size.

In the first and third cases the fragments of bone were sufficiently large to allow of putting the wire through from the anterior surface

of the upper fragment to the surface of the fracture, then entering by the fractured surface of the lower fragment to bring it out on the anterior surface of that. Thus the wire did not enter or encroach on the joint cavity. The important point being to have the wire come out on corresponding points of the broken surfaces; it is well to drill the holes from these surfaces to the anterior surface of the bone, and in this way a very exact adjustment can be made.

In Case II. the small size of the pieces of bone made some other method of wiring necessary, and the circular wire running through the different fragments and gathering them together as by a purse-string, answered admirably. By this method, too, the wire can be carried, as was done in this case, through the ligament below a fragment that is too small to hold it.

This method of wiring by carrying a circular wire around the fragments was first practised in 1865 by Dr. Samuel Cabot in one of the earliest cases on record in which a wire was used for uniting the fragments of a patella. There was much suppuration in this case, done before the days of aseptic surgery, and the patient died five months after the operation. No autopsy could be obtained, but there was every evidence of a bony union between the fragments.

The second accident that happened to Case I shows that care in the avoidance of unusual strain is important even for some time after the joint appears to have recovered full strength and usefulness.

Passive motion may be begun much earlier with a wired patella than with one that is treated as a simple fracture. In the latter case the ligamentous union must have time to become firm or it will be stretched when a strain is brought upon it: when the patella is wired, however, we may expect bony union at the end of seven or eight weeks, and after this passive motion may be begun. It will be safer for some time, even after this, to wear a splint or stiff bandage when going about in order to avoid the chance of a sudden strain.

Since this paper was written, in 1891, the writer has seen no reason to change his opinion as to the wisdom of treating a simple fracture of the patella without operation, when the treatment can be properly carried out and the patient can give the requisite time.

While an incision in the knee joint is usually harmless, there comes an occasional case in which, without conscious departure from the

laws of strict asepsis, an inflammation does result, with disastrous consequences. The results with efficient apparatus have been, in the writer's hands, absolutely satisfactory, restoring the limb to normal usefulness. He feels, therefore, that this method should always be given the preference when there are no special indications for operation.

It may be urged with justice, however, that in laboring men, whose time is an important consideration, the method affording most rapid recovery has decided advantages, and certainly, in such cases, the operation will almost invariably be successful, and seems justifiable.

OBSERVATIONS UPON CANCER OF THE BREAST.

It is possible that some micro-organism may presently be discovered upon which cancer depends, and even that we may learn to treat the condition by some antitoxic injection; but, until that day arrives, the lines upon which we must fight the disease are those drawn upon our understanding of its primarily local beginning.

In the effort to limit its growth, the anatomical pursuit of the lymphatics in their course from the seat of disease is of the greatest importance, enabling us to follow the cancer beyond its macroscopic seat to the parts where it is still existing in a microscopic degree.

For many years the writer has made it a practice in removing a carcinomatous breast, to begin at the inner border and dissect the whole mammary gland off of the pectoral muscle, taking the fascia with it. The breast is thus rolled outwards towards the axilla and the dissection is followed close to the wall of the chest, removing all the loose cellular tissue back to the edge of the latissimus dorsi muscle, and then upwards into the axilla from which all loose tissues are removed. Whenever the pectoral muscle is in any degree involved it is thoroughly removed. The skin around the nipple is always widely cut away with the breast and if it is at all adherent to the growth a wide margin of healthy skin, about that which is adherent, is also removed.

He has not carried out what is known as the completed operation, which includes the removal of the pectoral muscle and dissection of the supra-clavicular space, in as large a proportion of cases as is advised by some of the advocates of this method.

About a year ago he looked up the notes of his operations and found 82 cases in which the diagnosis was confirmed by microscopical examination. Four of these 82 patients died from the immediate effects of the operation. These were all hospital patients operated upon many years ago when the nature of aseptic preparation was not

as thorough as at present. He sent letters of inquiry to the 78 patients who survived the operation, and received answers in regard to 49 of them. Of these 49 patients, 27 had died from recurrence of the disease.

The fatal recurrence occurred within one year in	16 cases.
Between 1 and 2 years in	4 cases.
Between 2 and 3 years in	3 cases.
Between 3 and 4 years in	2 cases.
Between 4 and 5 years in	2 cases.
In the eighth year	1 case.

In four cases death had occurred from other causes. Of these patients,

1 had lived, since operation	1 year.
1 had lived, since operation	2½ years.
1 had lived, since operation	5 years.
1 had lived, since operation	8 years.

In six cases secondary nodules had been removed since the first operation, and the patients had remained free from further recurrence.

(1) In this case a secondary nodule was removed three months after the first operation, and the patient has lived five years without recurrence.

(2) In this case a slight thickening in the axilla, of doubtful character, was removed six months after the primary operation, and the patient has lived four years without further recurrence.

(3) In this case the supra-clavicular glands enlarged four years after the primary operation. They were carefully dissected out, and the patient is still well, eight months later.

(4) In this case a recurrent nodule was removed two years after the first operation, and the patient is living and well eight years after this last operation.

(5) In this case a dissection of the axilla was made for a recurrence there, following a simple amputation of the breast done by another operator some months before. At the end of three years there has been no recurrence.

(6) In this case the right breast was removed, with axillary contents, five years ago. The report is received that within three months

the left breast has been removed on account of cancer which had appeared in it.

In eleven cases there has been no recurrence. Of these patients,

3 have survived	2½ years.
1 has survived	3½ years.
1 has survived	4½ years.
1 has survived	7 years.
2 have survived	8 years.
1 has survived	9 years.
1 has survived	10 years.

From these tables we see that there are eleven patients who are living without recurrence, more than three years after the last operation, and that two patients who died of other ailments had lived more than three years without any recurrence of the cancer.

If we count these cases which passed the three-year limit as cures, and calculate their percentage among the 49 cases heard from, we have 26 per cent. of cures among our cases. This is not, however, a fair estimate, for it is probable that among the cases not heard from the percentage of recurrence was greater than among those whose after-history we learned.

If we take the whole number of 78 cases as the basis of our calculation and consider all of the cases not heard from as failures, we still have 17 per cent. of success. The true rate is somewhere between these figures.

An immunity from recurrence for three years is held by many operators to warrant a case being considered as a cure. A glance at the first table published above shows that three years' immunity is too short to establish a claim for cure, for in it are mentioned five patients who had more than three years' health, and, still, finally died of the disease.

The proportion of success in the above series of cases compares favorably with that reported by other operators.

The thoroughness of the operation practised has been continually improved; and it is probable that the more recent cases, many of which, done within the past eighteen months, are not included in these statistics, will show an even greater measure of success.

The cases operated upon were in no way selected cases, and in many of them the disease was so far advanced that the operation was resorted to as a forlorn hope with the object of relieving pain rather than with any expectation of eradicating the disease. In most cases the axillary glands were found carcinomatous, even when no enlargement had been made out before the operation. It is an encouraging fact that in some seemingly hopeless cases a long period of immunity has followed the thorough removal of the growth.

Among these cases were several in which the carcinoma appeared as a secondary change in a breast which had suffered from a chronic circumscribed mastitis.

In one recent case the commencement of this change was observed. The patient, with a wide nursing experience, and with a sister who had had a cancer of the breast, kept a sharp watch upon one of her breasts which had for many years been somewhat thickened. She came for examination because she had noticed a very slight adhesion of the skin to the breast at one point. This was so slight as to be only perceived when the skin was pinched up so as to lift it from the breast, when a very slight dimpling at one point could be made out. There was no retraction of the nipple, although the suspicious point lay just below it. An exploratory operation showed a little cancerous point smaller than a pea, and buried in the fibrous tissue left by an old chronic mastitis. In this case the axillary glands showed no cancerous change.

This is the most striking of five patients operated upon by the writer within the past year, in all of whom the existence of cancer was regarded as very doubtful before operation, but in whom cancer was found.

These cases emphasize the importance of operating upon all doubtful cases with the object of discovering such commencing carcinomata early, and thus giving the patient the advantage of a thorough removal while there is a good chance that the disease is still localized and amenable to operative treatment.

One case was interesting from the difficulty of its diagnosis. The patient noticed first a gland in the axilla which was somewhat enlarged and slightly sensitive. When this was first seen examination of the breast was made with negative results. Subsequently the

breast was examined on one or two occasions, and absolutely no enlargement could be found anywhere.

The patient was seen by another surgeon in order that the question of possible carcinoma of the breast should be thoroughly considered, and still no point of disease in the breast could be found. It was finally decided to remove the gland in the axilla and by microscopical examination determine the character of its enlargement. This was done. The gland was found to be cancerous, and the whole breast, with the axillary contents, was at once removed. Deep down, close to the pectoral muscle, there was found a minute nodule of carcinoma which had served as the primary seat for the disease.

In all cases of doubt it is a good plan to have a microscope at hand for the immediate examination of any suspicious point during the operation. Usually, however, the dense gray nodule with opaque yellow tracery upon it is so characteristic that the diagnosis can be made with certainty by macroscopic appearances.

Among the above cases were two instances in which the disease appeared in sisters, a fact which is of interest in connection with the question of inherited tendency to the disease.

REMARKS UPON THE PROPER SURGICAL TREATMENT OF TUBERCULOUS BONE DISEASE.[1]

The surgical treatment of tuberculosis of bone is a subject about which it is difficult to generalize, for the varying conditions of the patient and the part affected often call for a corresponding variation of the plan of treatment.

A tuberculosis is an infective process against which the tissues strive to protect themselves with very various degrees of success in different parts of the body and in different persons. The process by which this protection is obtained is mainly by formation of a wall of connective tissue, more or less dense, about the tuberculous mass, shutting it in and preventing its spread through the tissues. When this protective effort is of sufficient power to successfully resist the tuberculosis, it does so by thoroughly encapsulating the process and, in that case, the masses of bacilli, cells and the waste products of the cells are compressed within a slowly contracting capsule and undergo cheesy degeneration until, finally, they may even be changed to chalky concretions.

The success of this limiting effort on the part of the tissues depends in a considerable degree upon the vigor of the individual, so that in tuberculous disease of bone (as is well known in tuberculous disease in the lung) a decided improvement in the surroundings and habits of the patient may bring about a cessation of the process.

In many cases of bone tuberculosis the surgeon's reliance must be upon this power of nature to limit the process and must be directed wholly to the patient's general condition with the added benefit of rest to the diseased part, which our back-braces, hip-splints and other fixative apparatus provide.

The numberless cases of recovery from joint tuberculosis in children attest the effectiveness of nature's cure.

[1] At a discussion of the subject of "Bone Tuberculosis" in the Surgical Section of the Suffolk District Medical Society, November 3, 1897.

The most that we can hope from operation in tuberculosis of bone is the removal of a local focus which is acting injuriously in two ways: first, by interference with the functions of the bone involved; and, second, by the general infection of the system with poisonous products elaborated at the seat of disease.

Tuberculosis of bone is generally a secondary process following some deeper infection. Its removal therefore is, as it were, only palliative and leaves somewhere the primary focus untouched. This primary focus is usually situated in the lymphatic system; not uncommonly in the glands connected with the respiratory or digestive organs. Commonly, also, this primary focus of the disease is well encapsulated, so that when the active and more serious focus of the disease is removed the patient's return to health is gratifying and often long enduring.

It is interesting now to consider what degree of thoroughness we can obtain in the removal of these local tuberculoses. By the amputation of a limb above the seat of disease the removal of the local focus is thoroughly accomplished. Occasionally, a localized tuberculosis can be entirely dissected out with a considerable margin of healthy tissue around it. When this can be done without bringing the tuberculous parts in contact with the healthy, of course that will constitute a thorough removal. This is rarely possible in tuberculosis of bone on account of the difficulties of the deep dissection; and almost invariably the parts about are more or less infected with the bacilli during the process of removal. In operation upon joints this is particularly true; for the infected synovial membrane is often very difficult of removal, as it dips in between the ligaments and the surrounding muscles and must be dissected away piecemeal. During this slow dissection the freshly wounded surfaces are in constant contact with the tuberculous material.

Fortunately the tissues are able to dispose of a moderate dose of the poison, so that a removal that is approximately thorough answers almost as well as if it were absolutely so. It is probable that microscopical amounts of tuberculous material which are left behind are actually destroyed and removed by the tissues. Larger portions are encapsulated and it is interesting to note that these operations, which are followed by thoroughly satisfactory healing, often leave behind them little foci of tuberculous material buried in the cicatricial tissue.

A case which well illustrates this fell under the writer's notice in 1879. The subject was a middle-aged colored woman who had been operated upon by Dr. R. M. Hodges several years before, when he made a thorough resection of the elbow-joint for tuberculosis. The healing had been satisfactory and, at the time the patient fell under the writer's observation, the false joint was entirely free from any signs of disease, healing having been accomplished several years before and having left a useful flail-like joint.

The patient was very thin, so that examination of this joint was easy, and no sign of disease about it could be detected. She shortly died of pulmonary tuberculosis, and examination of the elbow was made. Contrary to expectation, a number of little collections of cheesy material were found in the cicatricial tissue making up the false joint. None of these showed the slightest reaction about them and seemed to be in an entirely quiescent condition.

Accepting then the position that in these cases the surgeon's operation is necessarily incomplete and that nature must even afterwards do much to accomplish the cure, it is plain how important it is for the surgeon to do all in his power to improve the patient's general condition and to so arrange his operation as to obviate if possible a long confinement in bed.

The removal of tuberculous material must be as thorough as it can possibly be made, the bony focus being always hunted up and entirely removed. Where possible, a considerable surrounding portion of healthy bone should be removed with it. This is usually accomplished in resections of the knee and elbow, and also in those cases of disease of the hip in which the tuberculous process is confined to the head of the femur. When, however, the pelvic bones are also implicated, this is more difficult of accomplishment.

When tuberculosis attacks bones in their continuity where it is impossible to remove considerable portions of the bone without seriously interfering with the functions of the part, surgeons usually resort to curetting for the removal of the diseased portions. As these portions are softened, they can usually be quite thoroughly removed with the sharp spoon, and the harder consistency of the surrounding healthy parts gives us considerable help in determining when the diseased portions has

been thoroughly removed.[1] After such an operation it is not uncommon to see the surface curetted remain in a carious condition for some little time. This is due to a death of the surface of the bone bruised by the instrument. And in some cases the presence of the tuberculous process reinfects the bone and leads to a continuance of the tuberculosis.

In the carpus and tarsus this recurrence of tuberculosis is almost certain to occur. This is doubtless due in part to the comparatively ill-nourished condition of these bones. Surrounded as they are by cartilaginous joint-surfaces, their periosteal envelope, through which they receive nourishment, is comparatively scanty. It is usually well, therefore, to wholly remove any of these bones that are diseased.

In the wrist the functional result after a removal of many of the carpal bones is usually not good, but in the ankle these operations, when undertaken in the young, give excellent results.

This brings us to speak of the effect of age upon our treatment of tuberculous lesions of bone. So great is this effect that we might almost say that the success of treatment in cases of tuberculosis, other things being equal, is in inverse ratio to the age; that is, the older the patient, the worse the prognosis.

It is often a nice question of judgment whether, in a certain patient, to choose a partial operation, as the removal of the diseased tarsal bones, for instance, or to give up any attempt to save the joint and accomplish a thorough removal of the tuberculous parts by amputation.

This same question as between a partial operation and amputation also arises in cases much exhausted by the disease, and many patients will recover after an amputation, which enables them to quickly leave the bed, who would succumb to the long suppurating process following extensive resection of tuberculous parts.

After-Treatment. — The importance of getting patients quickly out of bed and out of doors has been dwelt upon. The local treatment should, I think, consist in giving the parts absolute rest and, if possible, applying gentle, even pressure over the whole seat of disease. In some cases when removal has been very thorough, a complete closure of the

[1] Dr. Nichols's observation, that the disease extends about half an inch beyond the point where it can be seen by the naked eye, shows how necessary it is to remove a margin of seemingly healthy bone with the diseased.

wound may be adopted; and some cases of resection will do well when the wound is wholly closed or where only a slight dependent opening is left for drainage for a short time. In other cases, where, owing to the difficulties of the operation, removal of the tuberculous parts is less complete, this opening is made not only to provide drainage but to afford access to the parts for subsequent treatment, with the hope of enabling and assisting the tissues to throw off the tuberculous process. This may be done by leaving the bony cavity widely open and packed with gauze, or in case of a joint, by carrying through it large wicks of gauze.

We have in iodoform a substance which has, in a measure, a specific effect upon tuberculous material. It seems to act by stimulating the tissues to an adequate resistance to the tuberculous material left after operation. In a case of an extensive cavity iodoform is generally applied in the form of iodoform gauze or by the means of setons, which are very useful in the ankle- and wrist-joints. When we have considerable sinuses which it is difficult to reach in the application of gauze, iodoform oil affords a good means of applying the drug to the deeper parts and often excellent results are obtained by its use.

Even after healing has been accomplished, it is usually important to protect the parts from motion for a considerable time by the application of apparatus, as, if motion is allowed, the disease is apt to reappear.

Sometimes in connection with the tuberculous process in the bone we have very large abscesses in the soft parts. When all parts of these abscesses can be reached and thoroughly curetted, it is not uncommon to obtain a complete closure of the greater part of the abscess by stitching its walls together with deep buried stitches, and, if this can be accomplished, it is the best method of bringing about a cure.

In many cases, however, this thorough curetting is not possible, notably in cases of psoas abscess.

The danger of interference where the operation cannot be thorough is that, if large portions of tuberculous material are left, the infection of the denuded parts which have been curetted rapidly takes place, and this new invasion of the freshly wounded tissue is often accompanied by considerable hectic fever, so that the patient is rather worse off instead of being improved by the attempt at thorough operation.

There is also considerable danger of infecting the parts with other organisms beside the bacilli and thereby bringing about a fever from infection by other pus organisms. In those cases, therefore, where the whole abscess cannot be thoroughly treated, it is wiser to make a small opening, large enough to allow of the discharge of the tuberculous cheesy masses which exist in these abscesses, and to then be content with the injection of iodoform oil and thorough drainage.

The gradual contraction of the walls of the abscess by reason of the cicatricial tissue surrounding it and, also, by reason of the intra-abdominal pressure in cases of psoas abscess, usually brings about a satisfactory condition of improvement, although absolute cure of one of these abscesses is extremely rare.

A CASE OF SARCOMA OF THE SCAPULA.

Removal of the Arm with the Scapula and Greater Part of the Clavicle: Recovery.

The following case is reported as a contribution to the statistics of this operation, which has been done, as yet, in so few instances that an accurate estimation of its dangers cannot be made.

Harry K., aged twelve, entered the Massachusetts General Hospital February 3, 1896, and the following history was obtained.

At birth there was some accident to the right shoulder, which was always prominent. He was never able to raise that hand above his face.

Last October he received a blow on the shoulder; and soon after a swelling appeared, which has increased greatly in size and been accompanied by much dull pain. Examination showed the scapula to be occupied and masked by a large tumor which extended forward under the clavicle and down to the axilla. Posteriorly, this tumor reached a point beyond the limits of the bone.

It was as freely movable over the chest wall as the normal scapula would have been.

The superficial veins were considerably enlarged. The arm was atrophied. At one point in the posterior aspect of the tumor a small opening had been made to reach what seemed to be a collection of fluid. Nothing but blood had, however, been obtained by this operation, and the wound had healed by a pigmented scar which attached the skin to the surface of the tumor.

It was evident that for the complete removal of the growth the whole upper extremity must be taken with it. The patient's pulse was of a rather unsatisfactory character, being feeble and not having sustained strength. He was put upon strychnia for a few days, and this condition was greatly improved. Operation was done on the 12th of February.

An incision was made over the upper border of the clavicle, beginning just outside of the sterno-clavicular articulation and running outward over the top of the shoulder. This incision was carried down through the periosteum of the clavicle, and with the periosteum elevator the bone was quickly stripped and divided at the junction of the middle and inner thirds. The outer part of the bone was now removed, and the subclavius muscle being divided, ready access was obtained to the subclavian vessels, which were ligated and divided, the distal ends having been temporarily controlled by pressure forceps.

The incision over the shoulder was now completed by being curved forward and downward so that the skin covering the point and anterior aspect of the shoulder formed a large flap attached anteriorly. The scapula and arm were now rapidly separated from the body by severing their muscular attachments, the skin over the back of the tumor being removed with it. A few bleeding-points were caught issuing from between the ribs and others in the divided muscles of the neck.

The hemorrhage, however, was trifling and was readily controlled. One or two small axillary glands were removed, and the skin flap was then stitched over the shoulder and made a satisfactory coaptation of the wound.

A microscopical examination of the tumor was made by Dr. W. F. Whitney. The following is his account of its pathology:

"The growth was a more or less rounded one, involving the upper half of scapula, the bone of which could be still found in the midst of the mass. The tissues about the head of the humerus were also infiltrated, although the joint itself was not broken into. Its size in general could be compared to that of a small cocoa-nut. On section it presented a slightly opaque, grayish surface of medullary consistency, and in places almost diffluent and hemorrhagic. Microscopic examination showed it to be made up of very large, round cells, between which was a little granular material, with here and there fine fibrous bands running through the growth, giving it a lobulated structure. The blood-vessels were mere channels hollowed out in the growth without any distinct walls. The diagnosis is a large, round-celled sarcoma, probably originating in the connective tissue of the scapula and involving the bone secondarily."

The patient was pretty weak for a couple of days, but made a good recovery with primary union of the wound.

Injections of the toxins of the streptococcus of erysipelas and of the bacillus prodigiosus were practised for a fortnight or three weeks.

About three months after operation, the patient returned to show some little hard lumps in the supraclavicular region. These were removed, and found to be bulbous outgrowths of the ends of the cervical nerves. There was no sign of any local recurrence of the tumor at that time.

In July, five months after operation, the boy presented himself complaining of a general feeling of malaise, with pain in the head and through the back. At this time there was a slight projecting growth over the left temporal bone which was evidently a recurrence of the sarcoma. From this time he rapidly failed, and died in the middle of the summer with symptoms suggesting sarcoma of the brain. No autopsy could be obtained.

A CASE OF UNIFORM CONTRACTION OF ALL OF THE FLEXOR MUSCLES IN THE FOREARM, RELIEVED BY AN OPEN INCISION.

THE following case is briefly reported to draw attention to one or two considerations, which, it seems to the writer, should determine our selection of the proper point for section of contracted muscles in the forearm.

Annie L. M., fourteen years of age, entered the Massachusetts General Hospital August 12, 1886, with her left wrist strongly drawn over by a uniform contraction of all of the flexor muscles to the wrist and fingers. These muscles and tendons were not fixed by inflammatory adhesions, but were simply so shortened that they would not permit the extension of hand and fingers. When the wrist was strongly flexed, the fingers could be completely extended, and when, on the other hand, the fingers were tightly closed, the wrist and metacarpus could be brought into line with the arm. The extensor muscles were not paralyzed, although they were, perhaps, less powerful than they should have been.

This condition had existed since the girl was three years old, and had followed a fracture of the forearm with confinement in splints at that time.

The motions of the wrist and fingers, although limited, were fairly strong, and the condition was objectionable on account of its unsightliness and its interference with her playing on the pianoforte. With her hand in the flexed position she could not strike an octave.

An attempt was made, under ether, to forcibly straighten the wrist, but to all the force that could be safely applied it did not budge a particle. After considerable demur, the parents finally decided upon an operation.

August 20th. Ether was given and an incision was made across the forearm, about three inches above the wrist joint. All of the flexor

tendons, to the number of twelve, were divided (flexor carpi radialis, flexor carpi ulnaris, palmaris longus, flexor sublimis digitorum, four tendons, flexor profundus digitorum, four tendons, and flexor longus pollicis). The fingers and wrist were now easily straightened and secured to a splint, and the wound was brought together with silk sutures. The whole operation was done with extreme care in carrying out antiseptic precautions, and healing took place by first intention. The splint was taken off on the thirteenth day, and the next day the patient could somewhat flex the fingers herself. She went home on the seventeenth day, with directions to carefully attend to active and passive movements of the fingers. When seen again, some months later, there was very good motion in both flexion and extension, although there was some adhesion of the muscles to the scar. She told us that she had an illness, said to be typhoid fever, shortly after her return home, so that for several weeks at that time the exercise of her fingers was wholly neglected.

On September 13th, 1888, her mother wrote as follows: "We think the cords have not contracted any since the operation. The arm is as strong and not less useful than before the operation. She plays the piano and can reach a full chord, but without much force. The fingers lack strength at the tips, so that she has not the power to strike them down on the keys bent, but lays them down flat. When she wishes to grasp anything firmly, she takes it between the thumb and the palm of the hand, the fingers remaining nearly straight."

The difficulty in flexing the terminal phalanges seems to be due largely to the adhesion of the tendons at the scar. How much less troublesome this might have been, had the motions of the fingers been continuously attended to just after the operation, it is hard to say. Even with its limitations, the parents and child feel the relief of deformity and increased usefulness of the hand to be a great gain over the old condition.

The point of incision, so far above the wrist, was selected in this case for three reasons. First: it avoided opening the bursa which surrounds all of the flexor tendons near the annular ligament. This bursa communicates with the carpal joints, and any inflammation originating in it quickly extends to and disables the wrist.

Second: It did not divide the tendons where they lay close alongside

of each other, and would therefore be hopelessly matted together by any slight inflammatory adhesion. The healing of a tendon within a synovial groove causes a more or less intimate adhesion to an unyielding sheath, while a tendon wounded in the midst of lax connective tissue is much more likely to retain its freedom of motion.

Third: There seems to be a very decided advantage in dividing the tendons at a point where the muscular fibres are already attached to them. In this way they are not separated from their respective muscular bellies, but some of the muscular fibres remain attached to the distal portion of the tendon, preventing a too great separation of the parts, and serving as a guide for the reparative process which is to reunite them. This third advantage attaches epecially to the division of the tendons of the flexors of the fingers.

All of these considerations seemed of practical value in the performance of the operation, and the favorable healing with the preservation of function confirmed this opinion. Whether this practice should be applied to the section of other muscles of the pennate variety experience will show. Fortunately, in no other part of the body is the individual independence of the muscles so important as in the forearm.